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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/606,429	06/28/2000	Tijana Rajh	0003/00724	6109

7590

12/19/2002

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EXAMINER

EL-SHAMMAA, MARY A

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 12/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/606,429

Applicant(s)

RAJH ET AL.

Examiner

Mary A. El-Shammaa

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6, 8-17, 19, 20, and 22-27 is/are rejected.
- 7) ☒ Claim(s) 4, 7, 18 and 21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 60 in Figure 3. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification: Minor Objections

The disclosure is objected to because of the following informalities: on page 8, line 18 "oligonculeotide" should be changed to "oligonucleotide". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 6, 12, 15, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Weiss et al. (5,990,479).

Regarding claims 1-3 Weiss et al. discloses a method for detecting molecules that comprises the steps of determining the electronic status of a semiconductor, having electronic communication between the molecules and the semiconductor, subjecting the semiconductor to an influx of energy, and either optically or electrically determining the electronic status of the semiconductor (See Column 4, Lines 27-45 and Column 9, Lines 3-14 and 37-56).

Regarding claims 6 and 15, Weiss et al. discloses moieties that can be bidentate which are positioned between the molecules and the semiconductors (See Column 5, Lines 34-40).

Regarding claim 12, Weiss et al. discloses a semiconductor having first and second energy levels, electrical contact between the semiconductor and the molecules, electrons moving from the molecule to the second energy level, and determining changes in the first optical characteristic (See Column 9, Lines 15-55).

Regarding claim 19, Weiss et al. discloses a semiconductor that has a diameter between 1 and 20 nanometers (See Column 4, Lines 48-56).

Claims 22-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Bawendi et al. (6,306,610).

Regarding claims 22 and 23, Bawendi et al. discloses a method for detecting target moieties comprising binding biological material, which has an affinity to the target moiety, to nanocrystalline semiconductor particles, facilitating entry of the bound material into an organelle, and subjecting the semiconductor to radiation (See Column 4, Lines 7-26 and 57-62). Bawendi et al. further discloses that the biological material is genetic material (See Column 5, Lines 6-8 and 18-26).

Regarding claim 24, Bawendi et al. discloses the use of cells and subcellular organelles, which includes the nucleus of a cell (See Column 5, Lines 6-8).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weiss et al. in view of Wood et al. (5,965,877).

Regarding claims 8-11, 13, and 14 Weiss et al. discloses a method for detecting molecules comprising a semiconductor, but does not disclose the semiconductor comprising a valence band containing electrons and a conductive band. Wood et al. discloses a semiconductor with a valence band containing electrons and a conductive band, wherein an energy influx causes

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electrons to relocate to the conductance band (See Column 11, Lines 30-56). Furthermore, it is understood that the molecules are either electron donators or acceptors (See Column 11, Lines 41-50). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a semiconductor comprising a valence band containing electrons and a conductive band as taught by Wood et al. because this would result in a more accurate detection method.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weiss et al. in view of Meade et al. (5,591,578).

Weiss et al. discloses a semiconductor having first and second energy levels, electrical contact between the semiconductor and the molecules, electrons moving from the molecule to the second energy level, and determining changes in the first optical characteristic (See Column 9, Lines 15-55). Weiss et al. does not disclose a moiety, which either withdraws or donates electrons from the molecule, being in electrical communication with the molecule. Meade et al. discloses an electron donating, or an electron accepting, moiety that is in electrical communication with the biological molecule (See Column 5, Lines 31-36 and Column 15, Lines 59-61). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the moiety in electrical communication with the molecule as taught by Meade et al. because this would allow the moiety to either donate or accept electrons from the molecule.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weiss et al. in view of Han et al. (6,043,428).

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Weiss et al. does not disclose the movement of electrons resulting in the formation of an oxidative region on the semiconductor. Han et al. discloses that moving electrons causes an oxidative region on the semiconductor to be formed (See Column 16, Lines 54-60). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the oxidative region taught by Han et al. to modify the semiconductor of Weiss et al. because this would procure a more effective semiconductor.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al. in view of Haddon et al. (6,331,262).

Bawendi et al. discloses a method for detecting target moieties comprising binding biological material, which has an affinity to the target moiety, to nanocrystalline semiconductor particles, facilitating entry of the bound material into an organelle, and subjecting the semiconductor to radiation (See Column 4, Lines 7-26 and 57-62). Bawendi et al. does not disclose the charge pair separation being detected via Electron Paramagnetic Resonance. Haddon et al. discloses the use of Electron Paramagnetic Resonance to detect charge pair separation (See Column 10, Lines 54-57). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the teaching of Haddon et al. of Electron Paramagnetic Resonance to detect the charge pair separation because this method would increase the precision in the detection method.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weiss et al. in view of Rosen et al. (6,125,529).

Weiss et al. discloses a method for detecting molecules comprising a semiconductor, but does not disclose the semiconductors being composed of metal oxides. Rosen et al. discloses

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semiconductors that are metal oxides from the group disclosed in claim 5 of the present application (See Column 6, Lines 53-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a metal oxide semiconductor as taught by Rosen et al. because metal oxide semiconductors provide additional sensitivity.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al. in view of Uber, III et al. (6,414,318).

Regarding claims 26 and 27, Bawendi et al. does not disclose the charge separation being detected via an electronic signal that can be amplified. Uber, III et al. discloses an electronic signal that can be amplified used to detect charge separation (See Column 1, Lines 10-27). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the electronic signal taught by Uber, III et al. to detect the charge separation.

Allowable Subject Matter

Claims 4 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art was found disclosing semiconductors of octahedral metal oxides.

Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and

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any intervening claims. No prior art was found disclosing the moieties being dihydroxyl phenyls.

Claim 21 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art was found disclosing an oxidative region formed on a semiconductor facilitating cleavage of molecules.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (5,302,832), (4,885,633), (6,051,194), (6,180,496).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary A. El-Shammaa whose telephone number is 703.308.0851. The examiner can normally be reached on M-F(8:30am-5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on 703.308.4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9318 for regular communications and 703.872.9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.872.9317.


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December 13, 2002



JOHN R. LEE
SUPERVISORY PATENT EXAMINER
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